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S.No.	Details	Description
1.	INSTITUTION NAME	LNIPE, NERC GUWAHATI
2.	DEPARTMENT	PHYSICAL EDUCATION
3.	NAME OF PH.D. SCHOLAR (eg. Surname, First Name, Middle name)	PUJA KUMARI
4.	NAME OF SUPERVISOR (don't use Professor/Doctor) *please enter Joint Supervisor name/Co-Supervisor name, if any, separated by 'and' (e.g. Yadav, Ravi and Sharma, Ashish)	SUJAY BISHT
5.	TYPE OF DEGREE	PhD IN PHYSICAL EDUCATION
6.	REGISTRATION YEAR (YYYY, e.g. 2021)	2021
7.	TITLE/TOPIC (Special Characters &!#$%^*()+=-[]\\\';,./{ }|\:? etc. are not allowed)	A PROFILE OF SELECTED PHYSICAL, PHYSIOLOGICAL AND ANTHROPOMETRICAL ATTRIBUTES OF FOUR ZONE OF WOMEN HOCKEY PLAYERS
8.	ABSTRACT Abstract should not contain any [E.g. !@ #$%^&*() etc. and more than 2048 characters will not be acceptable]	The aim of conducting this study to know the physical, physiological and anthropometrical characteristics of four zone of women hockey players. In order to conduct this study 200 women hockey players will be selected, fifty from each zone with their age ranging

		between 18 to 25. Data will be collected by conducting test like for speed endurance yo-yo test, for agility "T" test, for strength endurance sit-up test and for flexibility sit and reach test will use. **For physiological characteristics Maltron Bioscan will use to know about fat percentage, fat free mass and muscles mass, for vital capacity 12 spirometer will use, for hemoglobin hemocue will use and for VO2 max 12 min cooper run/walk test will conduct. In order to assess their anthropometrical attributes anthropometrical kit will use.** **The data will be analysed by using mean and standard deviation and to compare the performance among four zones, ANOVA test will use, with the significance level set at 0.05.**
9.	**KEYWORDS** **(please mention more than one keyword)**	**HOCKEY, SPEED ENDURANCE, HEMOGLOBIN, VITAL CAPACITY, LEG LENGTH, HEIGHT, WEIGHT, MEAN, SD, ANOVA**
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A PROFILE OF SELECTED PHYSICAL, PHYSIOLOGICAL AND ANTHROPOMETRIC ATTRIBUTES OF FOUR ZONE WOMEN HOCKEY PLAYERS

SHORT SYNOPSIS

Submitted in partial fulfillment for the requirement of the degree of

DOCTOR OF PHILOSOPHY

to

Lakshmibai National Institute of Physical Education, NERC Guwahati
(Deemed to be University)

by

Puja kumari
Ph.D./Regd./Ghy-15

Under the supervision of
Dr. Sujay Bisht
Assistant Professor, LNIPE NERC

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DECLARATION

I hereby declare that the short synopsis "A profile of selected physical, physiological and anthropometrical attributes of four zone of women hockey players" being submitted in partial fulfillment of the requirement for the degree of Doctor of Philosophy in Interdisciplinary Studies at Lakshmibai National Institute of Physical Education, Guwahati 2021-2022.

It is a bonafide record of original work carried out under the supervision of Dr. Sujay Bisht and has not been submitted in full or part to any other university or institute for a degree or diploma. Further, it is certified that the short synopsis is plagiarism free and the proof has been submitted.

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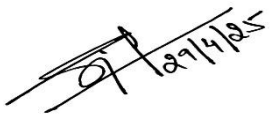

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ABSTRACT

The aim of conducting this study to know the physical, physiological and anthropometrical characteristics of four zone of women hockey players. In order to conduct this study 200 women hockey players will be selected, fifty from each zone with their age ranging between 18 to 25. Data will be collected by conducting test like for speed endurance yo-yo test, for agility "T" test, for strength endurance sit-up test and for flexibility sit and reach test will use.

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CONTENTS

S.No	Description	Page No
1	Introduction	1-2
2	Literature Review	2-5
3	Description of Broad Area	5-7
4	Objectives of the Study	7
5	Research Methodology	7-9
6	Expected outcome of the Research	9
	References	10-12
	Plagiarism Report	

INTRODUCTION

Research can be defined as a focused, careful, and methodical process of investigation. The aim of the research is to discover new knowledge, interpreting and revising knowledge. Research studies' primary objective is to increase our understanding of phenomena, behaviours, or theories in order to implement them practically through laws, policies, and theories. Research and investigation have made it feasible for us to know what we do.

At every level of the game, hockey players' success and performance are greatly influenced by their physical attributes. A hockey player must have a strong combination of strength, speed, agility, endurance, and coordination in order to succeed on the field. Each team job requires a certain set of physical characteristics to support the group's overall strategy and effectiveness. For instance, defensemen must be strong and physically fit to defend their goal and play rough in front of the goal posts, while forwards usually need to move swiftly and nimbly to get past opponents and create scoring opportunities.

A person's body composition can be more accurately determined by calculating their body fat percentage, which separates fat mass from lean mass (muscles, bones, and organs) in contrast to body weight alone. For athletes, especially hockey players, maintaining an ideal body fat percentage is essential since it affects their endurance, performance, and vulnerability to injury. Body fat percentage is a major factor in evaluating a hockey player's physical prowess and overall success. Players that are at their ideal body fat % usually have greater endurance, speed, and agility. Reduced body fat helps athletes maintain high-intensity efforts throughout the game by improving cardiovascular efficiency and reducing tiredness. Maintaining a healthy body fat percentage also aids in striking a balance between strength and mobility, both of which are necessary for performing the quick and explosive movements needed to play hockey.

Anthropometric characteristics, which are measurements of the size, shape, and composition of the human body, play a major role in determining the physical characteristics and performance levels of hockey players. These traits provide insight into how players' ability to perform effectively in various game areas is influenced by their muscular development, body proportions. Height and body composition are crucial anthropometric traits in hockey because they influence a player's reach, balance, centre of gravity, and overall physical presence on the field.

Taller athletes may be better at intercepting the ball and defending against opponents, but body

composition—which includes the distribution of fat and muscle mass—also affects agility, speed, and endurance. Players with the right body composition can balance strength and mobility, which enhances their capacity to perform dynamic movements like checking, shooting, and sprinting.

2. LITERATURE REVIEW

Prasad, R (2021) examined a link between the results of the yo-yo intermittent recovery test in India's east and north zones and a hockey ability test. 50 (50) male hockey players from the East and North Zones who had played collegiate hockey were selected for this study using Purposive Random Sampling. The association between the football skill test and the yo-yo intermittent recovery test for university-level players was assessed using Pearson's correlation at a significance level of 0.05. Because the computed significant value is significantly lower than the level of significance, the results indicate a significant negative connection between the Hockey Skill Test and the Yo-Yo Intermittent Recovery Test in Pre-Testing.

Mukesh (2021) developed predictive equation for identifying talented hockey players on the basis of performance-oriented attributes. The purpose of the study was to identify the talented hockey players as well as to find out independent variables which may be helpful for the coaches to identify the talent in hockey. The subjects were selected only from the north zone in India. One hundred forty-eight subjects were participated in this study. The assessment included factors such as aerobic capacity, agility, muscle mass, total body fat, speed, right-hand grip strength, height, weight, and BMI. After gathering and analysing the data, a regression equation was developed.

Kapteijns et.al (2021) The study aimed to determine if there is a relationship between the performance profiles of elite female field hockey players and the physical demands of competitive games. GPS technology was used to track the running performance of 20 elite female players across 26 competitive matches. The performance profiles were evaluated at two key points—preseason and midseason—over the course of two competitive seasons. To assess these profiles, a range of anthropometric and field-based performance tests were conducted, including a fitness test, incremental run test, 10-30 meter speed test, T-test, and vertical jump test. The results showed that, on average, the players covered a total distance of 5,384 meters (±835 meters), with 19% of that distance being covered at high-intensity exertion. Although

they covered the least amount of ground overall (calculated marginal means), attackers worked at a higher pace than midfielders and centre defenders. Between preseason and midseason, players' anaerobic and body composition performance both improved. aerobic capacity. There is a clear connection between running efficiency and aerobic performance among elite female hockey players. These results highlight the importance of having a strong aerobic capacity for performing at a high level in hockey.

S. Sarkar et.al (2019) The study aimed to compare anthropometric, body composition, physical fitness, and muscle injury markers between young Indian male hockey players and soccer players based on evidence. A total of 41 athletes (18 soccer players and 23 hockey players) were assessed. Various anthropometric measures and data were analyzed using spectrophotometric methods. The results showed that field hockey players had significantly higher grip strength and VO2max, but lower relative anaerobic power. Soccer players had higher LDH and CK-MB levels, suggesting more muscle damage and glycolytic activity. Correlation analysis revealed a strong positive relationship between LDH levels and work power output. Field hockey players exhibited better muscular coordination, balance, and aerobic endurance, while soccer players demonstrated superior anaerobic capacity and sprinting ability, attributed to higher glycolytic enzyme activity.

Surina et. al. (2018) Investigated about the physical development of hockey players. To carried out the research eighty-three elite hockey players were selected and assessed. The findings of this research showed that elite hockey players typically have body lengths that are "above average" with a propensity to shift towards the ordinary range. Hockey players make up a very small percentage of those with mean body lengths below the midpoint of the population. Elite hockey players, in comparison to individuals who don't engage in sports, tend to have higher body weights and BMIs. As players age, body weight and BMI become increasingly important factors in determining success in sports selection, based on morphological criteria.

Nathan, A, et.al (2018) The study explored the significance of body composition in the physiological assessments conducted during the National Hockey League (NHL) combine. Thirty seven male Canadian hockey players of university level had participated in this study. Partial correlation method was used to assess the relationship among body composition with national hockey league fitness test. In 4 of the 6 strength/power tests (Wingate Anaerobic Test, long jump, bench press, and both grip strengths), lower and upper lean tissue mass explained

significant amounts of variance. Although there were clear differences in grip strength between forwards and defensemen, particularly in right-hand strength and the probability of scoring with the left hand, no substantial disparities were observed in their body composition. Given that body composition is a key factor in several combine-related evaluations, this insight can be valuable for sport scientists and strength and conditioning coaches in tailoring training programs to improve performance in elite hockey players.

Allisse, M (2017) conducted a study on morphological, physiological and skating performance profiles of elite age-group ice hockey players based on repeated measures spread over one season. The purpose of this study was to examine the development of morphological, physiological, and skating performance traits in ice hockey players. Additionally, the outcomes of fitness assessments and training regimens carried out in off-ice settings and their connection to skating performance were examined. At the start and the end of the hockey season, 18 high level age-group ice hockey players were evaluated both off and on the ice. Also at the start of the ensuing hockey season was a third evaluation. The players outgrew the reference population for the same age in height, weight, bone breadths, and muscle girths. Significant improvements were seen in the muscular variables both during and between the two hockey seasons. However, only the off-season saw improvements in maximal aerobic power. During the hockey season, all skating performance tests showed noticeable improvements, but not in the off-season, when minor declines were seen.

Bariberi, D (2017) conducted a cross-sectional study to assess the sprinter's performance in relation with their body size and composition. In order to figure out the result ninety-eight male sprinters were chosen. Sprinters were categorized into three groups according to their personal best times. Body composition was evaluated using the skinfold method. The findings of the study indicated that elite sprinters had higher BMI, larger measurements for relaxed and contracted upper arm, thigh, and calf girth, as well as greater fat-free mass. However, they demonstrated lower ectomorph strength and power.

Sell, KM (2016) carried out research on heart rate and energy expenditure on field hockey players. To fulfil the purpose of this study data of heart rate and energy expenditure was taken at the time of competition. To assess maximal heart rate ten female hockey players were selected and performed yo-yo test. After one week, all the participants were instructed to wear heart rate monitor in and off-season competition. Again, the data of heart rate and energy expenditure was taken. It was observed thar there was no significant difference found among

backs, midfielders and forward. Result of the study was beneficial for the female hockey players and to know about physiological demands needed for the players.

Yadav, S. K (2015) did research on agility of high and low achievers male hockey players. Subjects were selected from Banaras Hindu University. Shuttle run and one-minute angular passing and receiving test was conducted to measure agility and high- and low-level achievers. Result of the study indicate that there was significant difference between high- and low-level achievers in terms of agility.

Bariberi, D (2017) A cross-sectional study was carried out to evaluate the relationship between sprinters' performance and their body size and composition. Ninety-eight male sprinters participated in the study and were categorized into three groups according to their personal best times. Body composition was measured using the skinfold technique. The findings showed that the highest-performing sprinters had greater BMI, larger relaxed and flexed upper arm girth, as well as increased thigh and calf girth, and higher fat-free mass. Additionally, these sprinters exhibited lower ectomorphy, along with greater strength and power.

Nikolaos, K (2015) A study was carried out to investigate the anthropometric and fitness characteristics of young basketball players in relation to their positions and playing time. The primary objective was to examine variations in body measurements, physical fitness, and balance based on players' positions and court time. The findings showed notable differences in height, weight, BMI, balance, lower limb endurance, and vertical jump across different positions and playing durations. Additionally, the analysis highlighted a strong correlation between balance and the players' anthropometric and fitness factors.

3. DESCRIPTION OF BROAD AREA

Here, we will describe the important terms which we will use in this study to know the characteristics of women hockey players

Speed Endurance:

Speed endurance refers to the capacity to maintain maximum or near-maximum speed over an extended period**.**

Agility:

Agility is defined as “a skill-related component of physical fitness that relates to the ability to rapidly change the position of the entire body in space with speed and accuracy.”

Strength Endurance:

Strength endurance is the ability to resist or exert force against resistance while experiencing fatigue.

Flexibility:

Flexibility is measured by determining the range of movement possible at a joint.

Vo2 Max:

VO2 max, or maximal oxygen uptake, refers to the maximum amount of oxygen a person can use during vigorous physical activity. It is a widely used metric to evaluate an athlete's aerobic endurance, either before or during training.

Vital Capacity:

Vital capacity is the greatest volume of air a person can breathe out after taking a deep inhalation.

Muscle Mass

Muscle mass is the physical size of the muscle.

Fat %

Fat is a highly concentrated energy source, with 1 gram providing 9 calories.

Fat Free Mass

"Body composition" refers to the proportion of fat mass relative to fat-free mass in the body.

Resting Heart Rate (RHR):

RHR is the number of times your heart beats per minute when a person is at rest.

Haemoglobin

Hemoglobin is a protein in red blood cells that carries oxygen from the lungs to the body's tissues and organs, and transports carbon dioxide back to the lungs.

Height

The measurement of a person’s height, taken from the top of the head to the feet.

Weight

The force with which an object is pulled toward the Earth, which is the result of the object's mass multiplied by its acceleration.

Shoulder Width:

Biacromial diameter is defined as the distance from the most lateral margins of the acromial processes with shoulders relaxed and elbows close to the body.

Hip Diameter:

It measures on the hip of the level of greater trochanter of the two sides.

Leg Length

Leg length is defined as the length of the femur + tibia.

Arm Length

Arm length is measured as the distance from the shoulder tip to the tip of the little finger.

4. OBJECTIVES OF THE STUDY

PROBLEM STATEMENT

The aim of the study will to create a profile of female hockey players based on specific physical, physiological, and anthropometric characteristics.

Research Objective

The objective of the present study will be zonal wise profiling of women's hockey players on the basis of selected Physical, Physiological and Anthropometric variables,"

5. RESEARCH METHODOLOGY

5.1 Selection of Subjects

For the purpose of this study, total 200 national women hockey players were selected by using purposive sampling technique. All the participants were belonging to SAI or Academy of different zones. At the time of collecting the data, all the subjects were reported free from any kind of disease or injury. The purpose of the research was explained to all the subjects, and motivated them to put their best during the test. The participants were selected for the study are mentioned below.

- SAI, NCOE Kolkata (East Zone)
- M.P. Hockey Academy (West Zone)

- SAI, STC Patiala (North Zone)
- SAI, STC Madikeri (South Zone)

5.2 Selection of Variables

Considering the available literature, consultations with experts, and the researcher's own understanding while keeping feasibility criteria in mind, the following physical, physiological, and anthropometric variables were selected to conduct the current study.

A. Physical Variables
- Speed Endurance
- Agility
- Strength Endurance
- Flexibility

B. Physiological Variables
- Fat %
- Fat Free Mass
- Muscles Mass
- Vital Capacity
- Haemoglobin
- Vo2 Max
- Resting Heart Rate

C. Anthropometrical Variables
- Height
- Weight
- Shoulder Width
- Leg Length
- Arm Length
- Hip Diameter

5.3 SELECTION OF VARIABLES, TESTS & CRITERION MEASURES

Category	Variable	Test	Criterion Measures
Physical	Speed endurance	Yo-Yo	Score
	Agility	T-test	Seconds
	Strength endurance	Sit-up	Per minute
	Flexibility	Goniometer	Centimetres
Physiological	Body Fat %	Maltron, Bioscan 916	Percentage

	Muscles mass	Maltron, Bioscan 916	Percentage
	Fat Free Mass	Maltron, Bioscan 916	Percentage
	Vital capacity	Spirometer	Litres
	Haemoglobin	HemoCueHb201 DM System	m.mol/L
	Vo2 max	12 minutes cooper run/walk	Metres
	Resting heart rate	Stopwatch(manually)	Beat/min
Anthropometric	Linear Measurement	Flexible steel tape	Centimetres
	Skeletal diameter	Anthropometer compass	Centimetres

5. EXPECTED OUTCOME

The research will provide physical, physiological and anthropometrical characteristics of four different zone i.e. north, south, east and west zone of women hockey players and on the basis of their characteristics they will be able to evaluate their current performance in sports.

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